FACT SHEET FOR NPDES PERMIT WA0020249

CITY OF CAMAS

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) of permits, which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the state of Washington to administer the NPDES permit program. Chapter 90.48 Revised Code of Washington (RCW) defines the Department of Ecology's (Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits [Chapter 173-220 Washington Administrative Code (WAC)], technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	City of Camas
Facility Name and Address	City of Camas Wastewater Treatment Plant P.O. Box 1055 Camas, WA 98507
Type of Treatment	Activated sludge with filtration capability and UV disinfection
Discharge Location	Columbia River Latitude: 45º 34' 36" N Longitude: 122º 23' 28" W.
Water Body ID Number	Old ID No. WA-CR-1010, New ID No. 1220169456238

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

The City of Camas wastewater treatment starts in the collection system where over a thousand customers have septic tanks that discharge to the centralized sewage treatment plant. There are also several industrial customers. These sources have resulted in dilute influent to the plant. The plant itself has influent screening, primary clarifiers, followed by an activated sludge system. Primary clarifiers are used to remove sludge and grit. To control pH, a sodium hydroxide solution or lime slurry may be mixed in downstream of the influent Parshall flume or mixed in at the aeration splitter box. The wastewater flows to up to three separate aeration basins which are designed for nitrogen removal via selectors, anoxic zones, and internal recycle. The effluent then flows to secondary clarifiers and then on to optional cloth filters. The effluent is disinfected with UV lights before being discharged to the Columbia River.

HISTORY

The existing facility for the City of Camas (City) was originally constructed in 1972 and has had several modifications since that time. The latest upgrade and expansion was completed in February of 2000. The current system should be able to effectively treat flows projected through the year 2015. The solids treatment was split into two phases with the first phase having been completed in 2000 and the second phase to be completed in 2007 and last through 2027.

COLLECTION SYSTEM STATUS

The collection system is comprised partly of conventional gravity flow sewers and septic tank effluent (STE). Most of these STE systems discharge by gravity to the pump stations and treatment plant and therefore do not have individual pumps. There were over 1,500 STE systems installed from 1985 to 1997 (facility plan was written in 1997). The City is not continuing to install new septic tanks. The Inflow and Infiltration (I/I) from the STE tanks appears to be negligible. However, I/I from the rest of the system does appear to be excessive according to the 1997 facility plan. The City has a continuing I/I reduction program. Because the City has Septic tanks discharging to the system, which reduced the loading to the plant, the City applied for exemption from the 85 percent removal requirement under the previous permit. The 1999 permit was granted with an 83 percent removal requirement for BOD and 81 percent for TSS. The City has again applied for a further reduction of these removal requirements. The City also receives dilute wastewater from Wafer Tech, one of several industrial customers. As of 1997, approximately one-third of the flow to the sewage treatment plant was from STE systems. There are seven pump stations serving the City, all of which are conventional gravity/lift systems.

TREATMENT PROCESSES

The wastewater for approximately one-third of the city starts at a septic tank where solids settle out and effluent flows by gravity to the treatment plant. The STE systems are checked on a yearly basis and pumped when full, which is three to five years for residences and as short as six-months for some businesses.

The treatment plant receives influent at the headworks where the flow is measured at a Parshall flume and a 24-hour sampler is available. The wastewater next passes through an inclined rotating fine screen or course bypass-screen and then on to two primary clarifiers (See the plant Schematic in Appendix B). The effluent from the primary clarifiers can be mixed with sodium-hydroxide or lime slurry to control pH as a result of industrial effluent from Wafer Tech. The pH control may also aid in the nitrogen removal process. Grit and sludge from the primary clarifiers is sent to the solids handling system which will be discussed later.

The flow enters one of three aeration basins that each has three selector zones. Aeration and mixing is driven by course and then fine bubble diffusers. The selector zones are followed by two anoxic zones, and then followed by three oxic zones. On-line dissolved oxygen (DO) meters aid in control of aeration blowers that are set to automatically turn on at certain DO levels.

The flow from the aeration basins can be returned for internal recycling or sent on to the two secondary clarifiers. The clarifiers are conventional round center-feed systems that allow for return activated sludge and waste activated sludge.

A magnetic flow meter follows the secondary clarifiers. A fabric filtration system manufactured by AQUADISC may be used if the TSS is not low enough to satisfy limits. The final treatment consists of UV disinfection which is set up in three horizontal banks with 12 modules each. There are a total of 288 bulbs for peak flow and redundancy requirements.

The plant is an activated sludge process with flow greater than one MGD, which according to WAC 173-230-140 places the facility at a Class IV certification. Because of the use of filtration the facility is considered to be tertiary treatment. The lead operator in charge of the treatment plant must therefore have a Class IV certification or higher and the operator in charge of each shift must be certified at Class III or higher. There are currently four operators working at the plant with each having one of the following certifications: Group I, II, III, and IV. The plant hours of operation are 6:00 a.m. to 4:30 p.m. during the weekdays and from 7:00 a.m. to 3:00 p.m. on weekends.

The facility upgrades were financed through a variety of sources with a large part coming from a State Revolving Fund (SRF) Loan for 20 years and a Public Works Trust Fund (PWTF) loan for 10 years, and through revenue bonds. A new facility plan upgrade is budgeted and scheduled for late 2004. The next plant upgrade is scheduled to include engineering for the new construction in 2005, design and bid for new construction in 2006, and the actual construction to take place in 2007. There is a 1998 refunding bond which has a life until April 2016, and there is a PWTF loan that will continue to be paid back until July 2019. A 1998 Department loan will be paid until September 2020. There is also a Department loan for an additional secondary clarifier which has a life through April 2017.

DISCHARGE OUTFALL

Secondary treated and disinfected effluent is discharged from the facility via an outfall into the Columbia River. The outfall extends approximately 850-feet from the north bank of the Columbia River and terminates at a depth of approximately 21 feet below Columbia River Datum (CRD) during low flows. The outfall is constructed of a 36-inch diameter corrugated steel pipe that terminates in a 150-foot long diffuser. The diffuser currently consists of eight 6-inch diameter port risers that are on 10-foot centers. All ports are in a vertical position and all are discharging horizontally downstream. Eight more ports are in place but closed off with blind flanges which were proposed to be opened during the plant expansion in 2007. Recent dilution modeling by the Department in March 2004 does not show an improvement in acute dilution in opening the diffuser flanges at the current design flow.

RESIDUAL SOLIDS

Solids are screened at the headworks. Solids from the primary clarifiers are sent first to a grit removal system, and then the liquid part goes on to a gravity thickener. Thickened sludge and scum are sent to one of two aerobic digesters that work in tandem. The digested sludge is mixed with a polymer to aid in thickening and dewatered at a centrifuge. The final sludge cake or biosolids are stored under cover until shipped off-site.

Grit is shipped off site for use in as soil amendments and rags, scum, and screenings are drained and disposed of as solid waste at the local solid waste transfer station. Solids removed from the final biosolids storage area are sent off-site to Fire Mountain Farms, or another permitted biosolids facility.

PERMIT STATUS

The previous permit for this facility was issued on February 19, 1999. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, Total Residual Chlorine, and Ammonia (narrative).

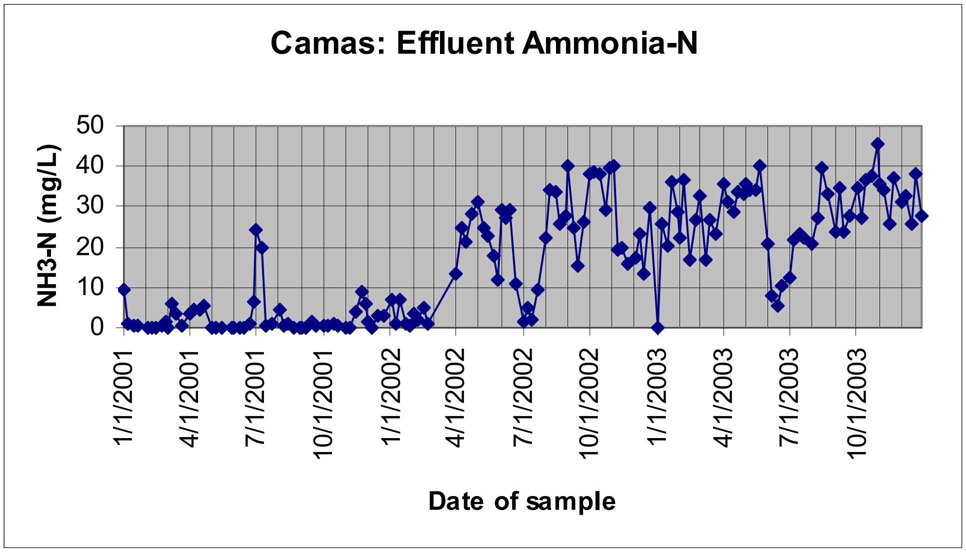
An application for permit renewal was submitted to the Department on August 21, 2003, and accepted by the Department on October 23, 2003.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection on February 25, 2004. The facility appeared to be operating properly at that time.

Since the upgrade of the plant in February 2000 there have been no violations of permit conditions, based on Discharge Monitoring Reports (DMRs) submitted to the Department. However, there has been a narrative ammonia limit in the permit that states "Optimize plant operation for nitrification and monitor." It appears that the plant was doing a good job of removing ammonia from January 2001 through March 2002. But in the last two years, from April of 2002, the facility has not been optimizing removal of ammonia (see figure 1 below).

Figure 1: Ammonia Removal at Camas from January 2001 to October 2003



Ammonia toxicity will be explained more thoroughly under "Considerations for Surface Water Quality" and "Toxic Pollutants" below.

The facility has stated in their 1997 facility plan that Inflow and Infiltration (I/I) is a problem. Federal regulation states that infiltration is excessive when average daily flow during a 7-14 day, non-rainfall period of seasonal high groundwater, is greater than 120 gallons per capita day (gpcd). Inflow is excessive when the average daily flow during periods of significant rainfall, such as during a storm event that causes ponding, is greater than 275 gpcd or causes hydraulic overloading of the treatment plant.

A March 2003 I/I report showed average rainfall for each month and therefore included rainfall and non-rainfall periods. The report shows the gallons per capita day (GPCD) which is the highest monthly flows divided by the population equivalent served. This GPCD is shown in the table below:

Year	Highest monthly flow	Population Equivalent	GPCD	Total Yearly Rainfall (in.)
2002	2.398	13,500	177.6	40.21
2001	2.594	12,500	207.5	35.12
2000	2.984	12,000	248.7	34.66

The report shows that I/I in general have been going down slightly each year over each of the last three years. It is not clear if this is due to a decrease in rainfall or any reductions on the part of the City. The 177.6 gpcd is still higher than the 120 gpcd that is considered excessive for the infiltration rate. It is therefore recommended that the City continue a program of fixing I/I problems, monitoring, and issuing a report each year.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The effluent is characterized as follows:

Table 1: Wastewater Characterization. Plant Upgraded in February 2000. Data examined for March 2000 through January 2004. (The following statistics are based on the monthly averages reported in the DMRs except for the ammonia which was calculated with all available daily entries.)

Parameter	Concentration
Flow	1.76 mgd (Avg.), 2.56 mgd (95th percentile)
BOD	218 lbs/day (95th percentile) 15.7 mg/L (95th percentile) 87% removal (5th percentile)
TSS	104 lbs/day (95th percentile) 7.75 mg/L (95th percentile) 95% removal (5th percentile)
pH (July 2000 – January 2004) pH was not under control until July 2000	6.03 S.U. (min), 6.1 (5th percentile) 8.13 S.U. (max), 7.6 (95th percentile)
Ammonia	**Summer (June – Sept)** 37 mg/L (95th percentile, 33 samples from June '02 – Sept '03) **Winter (Oct – May)** 39.1 mg/L (95th percentile, 67 samples from Jan '02 – Dec '03)
Fecal Coliform	120 org./100ml (95th percentile of 7-day geomean) 28 org./100ml (95th percentile of 30-day geomean)

The flow has been well within the design flow of the facility. Under phase I, which was completed in 2000 the facility was designed to treat a maximum monthly flow of 6.1 mgd and an average annual flow of 3.77 mgd. The flow averaged 1.76 mgd and was less than 2.56 mgd 95 percent of the time. BOD was within the allowable limit of 955 lbs/day and the plant was under 218 lbs/day 95 percent of the time. The BOD concentration was below 15.7 mg/L 95 percent of the time with a design limit was 30 mg/L on a monthly basis. The facility was able to remove 87 percent of the BOD 95 percent of the time. The minimum removal of BOD was limited to 83 percent.

The plant was within the allowable TSS limit of 1217 lbs/day and was under 104 lbs/day 95 percent of the time. With a concentration limit of 30 mg/L the facility was below 7.75 mg/L TSS. The facility was able to remove 95 percent of the TSS 95 percent of the time. The minimum removal of TSS was limited to 81 percent.

The facility has applied for a lower BOD and TSS removal rate which will be discussed later in this fact sheet.

The pH never went above 8.13 or below 6.03 standard units which kept the facility within the pH limits of 6.0 to 9.0 standard units.

As stated above the ammonia does not appear to have been optimized during the last two years of operation.

The fecal coliform was kept within the limits of 200 to 400 org/100 ml with the fecal coliform below 120 org/100 ml 95 percent of the time.

SEPA COMPLIANCE

The facility plan of 1994 would have required State Environmental Policy Act (SEPA) compliance. No other actions related to this permit have triggered SEPA compliance.

PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application and through an examination of DMRs. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the state of Washington were determined and included in this permit. The Department does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation**.** Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from the 1998 facility plan and the 2002 As Built Drawing Plans prepared by Gray and Osborne, Inc. and are as follows:

Table 2: Design Standards for the Camas WWTP.

Parameter	Design Quantity
Monthly average flow (max. month)	6.10 mgd
Monthly average dry weather flow	2.86 mgd
Instantaneous peak flow (hourly)	11.09 mgd
BOD_5 influent loading	5,616 lbs/day
TSS influent loading	6,405 lbs/day
TKN loading	942 lbs/day

The population equivalent used in the above design criteria is 23,548 (from the 1997 facility plan projected for the year 2015).

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD_5, and TSS are taken from Chapter 173-221 WAC are:

Table 3: Technology-based Limits from Regulation (Before Changes to BOD and TSS. See table 4).

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 ml Weekly Geometric Mean = 400 organisms/100 ml
BOD_5 (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration * Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration * Average Weekly Limit = 45 mg/L

*The previous permit had reduced limits for percent removal of BOD and TSS. This reduced limit was 83 percent removal for BOD and 81 percent removal for TSS. The Permittee has requested to have the percent removal requirement relaxed further due to dilute influent from WaferTech industries and due to the many STEP tanks throughout the system. Our permit guidance allows for BOD and TSS removal rates to be reduced in cases of dilute influent.

Because the influent is diluted, this means the effluent concentration limits should also be reduced. Gray and Osborne, the Permittee's consultant, submitted a final faxed letter on May 23, 2000, after a series of communications requesting a lower percent removal in the permit.

The consultants have shown that the influent during the maximum monthly flow of 6.1 mgd is comprised of 3.134 mgd from WaferTech and Linear Technologies and 2.966 mgd from conventional domestic, commercial, and I/I.

With the safeguard of a maximum limit of 20 mg/L for effluent BOD and TSS, a 70 percent removal rate is acceptable. This is based on several calculations as follows:

(Plant design loading)/(plant design flow)(8.34 lbs/gal) = (5,616 lbs./d BOD)/6.1 mgd)(8.34 lbs/gal) = 110 mg/L BOD.

The results for TSS are slightly higher, but a compromise was made to keep both TSS and BOD the same. The reduction rate was calculated as follows:

Removal of TSS and BOD = 0.83/(1+(3.134/2.966)(20/110)) = 70 percent

The effluent mass loading will need to be reduced to account for the reduced permit limit. The rationale for this is to maintain consistency with the method of calculating mass effluent limits. The Permittee had requested to have the effluent mass loading limit reduced from 1,217 lbs/day to 1,115 lbs/day. However, using the standard method of calculating mass effluent limit, the following effluent loading was determined for BOD and TSS:

Monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (6.1 mgd) x Concentration limit (20 mg/L) x 8.34 (conversion factor) = mass limit 1,017 lbs/day.

The technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

The weekly average effluent mass loading is calculated as 1.5 x monthly loading = 1,525 lbs/day.

Table 4: Technology-based Limits (After Changes to BOD and TSS Due to Dilute Influent).

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 ml Weekly Geometric Mean = 400 organisms/100 ml
BOD_5 (concentration)	Average Monthly Limit is the most stringent of the following: - 20 mg/L - may not exceed thirty percent (30%) of the average influent concentration Average Weekly Limit = 30 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 20 mg/L - may not exceed thirty percent (30%) of the average influent concentration Average Weekly Limit = 30 mg/L

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the

Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

ANTIDEGRADATION

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

One difficulty in implementing this policy is that the natural conditions of the water cannot be easily discerned from the conditions in the ambient environment as they exist today.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

A Total Maximum Daily Load Study (TMDL) is underway for the Columbia River System for Temperature. There are several parameters listed in the 303(d) list of limited water bodies. The 1998 303(d) listing of WRIA 28 has listings for Arsenic, fecal coliform, sediment bioassay, temperature, and total dissolved gas.

The total dissolved gas is almost entirely a product of excess water spilled at the upstream hydropower facilities and is not a product of wastewater facilities. The fecal coliform listings are a mile or more downstream of the Camas discharge.

Because the Camas facility uses UV disinfection, the discharge rates should be low enough that no fecal coliform will be detectable downstream at the 303(d) listed areas.

The arsenic was listed both upstream and downstream of the City of Camas in the 303(d) list, however the background in the vicinity of the Camas outfall was measured several orders of magnitude below the water quality criterion for arsenic. Arsenic was measured in the effluent but at low levels that were near the background levels. The sediment bioassay was down more than a mile and their does not appear to be toxics in the discharge that would settle out in the sediments.

There are temperature listings along most of the length of the Columbia. Diminishing riparian vegetation, increase thermal absorption due to dams (with shallower backwaters due to silt buildup), return flows from irrigation, and increased numbers of thermal discharges have all had significant effects on the Columbia River temperature as a whole. From relevant data, we have concluded that the POTW is not a significant source of thermal pollution.

The 90th percentile value for temperature in the summer months (June-September of 2000 - 2003) in the Columbia at Washougal was 21.48ºC based on 453 data points. This is above the temperature criterion for this section of the Columbia which is 20ºC.

A temperature TMDL is being done for the Columbia and Snake Rivers. However the TMDL is not completed. The temperature studies have shown that the main cause of the increased temperature in the system is the solar gain in the reservoirs (Ecology, 2004). More will be discussed about temperature at the Camas discharge later in this fact sheet.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

MIXING ZONES

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria. A new dilution modeling study was conducted by the Department in March of 2004 using available data (See Appendix C).

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to the Columbia River which is designated as a Class A receiving water in the vicinity of the outfall. Other nearby point source outfalls include the City of Washougal which is more than one mile upstream and the Fort James Camas L.L.C. paper mill, which is more than a mile downstream. All other outfalls are significantly more than a mile up or down stream. Significant nearby non-point sources of pollutants include stormwater from city and roads in the area.

Characteristic uses of Class A water include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliforms	100 organisms/100 ml maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	20 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

> A dilution analysis was last conducted in 1994 before the new plant came on-line. Some of the ambient conditions in the Columbia River have changed over time and more detailed information regarding temperature is now available through the USGS and ACOE web sites. The 1994 dilution analysis used UDKHDEN dilution model which tends to over predict the dilution compared to the UM3 model for these waters. The model also used a flux average model prediction rather than a centerline prediction which is recommended in the Department guidance for unidirectional water. The 1994 study assumed that the diffuser would have all 16 ports open, however; only 8 of the 16 ports were open. The other ports were closed with a blind flange.

It was therefore determined that, because of all these reasons, a new dilution analysis should be run. The considerations that went into the dilution model and the results of all of the model runs conducted by the Department in March 2004 are shown in Appendix C.

The UM3 model was run 25 times for both a critical summer and critical winter seasons. These runs produced four dilution factors that will be used in the following situations:

	Acute	Chronic
Aquatic Life (summer)	8	48
Aquatic Life (winter)	7	24
Human Health, Carcinogen		24
Human Health, Non-carcinogen		24

The summer low flow season is June through September and the winter is October through May.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical summer condition for the Columbia River is the seven day average low river flow with a recurrence interval of ten years (7Q10). The critical winter conditions used a median river flow and a high river flow that used the seven day average high flow with a recurrence interval of ten years (7Q90). Ambient data at critical conditions in the vicinity of the outfall were taken from a variety of reports. The flow, velocity and physical river data were taken from the 1994 Wastewater Facilities Plan by CH2MHill which was used in the 1994 dilution study. The temperature was taken from the USGS/ACOE web pages for the Columbia River dissolved gas network. The summer temperatures were taken from the Camas/Washougal station which had hourly data from May through late September. The maximum daily values were used to establish a 90th percentile. The winter temperatures were taken from the Warrendale station which is the nearest station with winter data. The pH percentiles were determined by combining two sets of data. There was only 12 months of monthly pH sampling. In 2002-2003 the Department sampled pH and a number of other parameters used in this report at station 28A100 which is near Vancouver Washington on the Columbia. In 1994 the USGS sampled pH 11 times. Because the pH sampling was so minimal, these two data sources were combined. The other conventional parameters and metals come from the 2002-2003 the Department sampling at station 28A100, which may be found at: http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?theyear=&tab=prelim_data&scrolly=267&wria=28&sta=28A100.

Ambient Columbia River Conditions Used In This Report

Parameter	Value used		
	Low	Med	High
Flow	81,400 cfs (7Q10)	192,400 cfs (Median)	522,000 cfs (7Q90)
Velocity	0.26 m/sec	0.58 m/sec	0.99 m/sec
Depth	21 ft	26.6 ft	40.9 ft
Temperature	21.48^{o}C (summer 90th percentile based on 453 points) 15.13 ^{o}C (winter 90th based on 728 points) 12.6 ^{o}C (yearly median based on 1125 points) 4.6 ^{o}C (winter 10th percentile based on 728 points)		
pH (high)	8.46 S.U. (winter 90th percentile based on 15 data points) 7.988 S.U. (summer 90th percentile based on 8 data points)		
Dissolved Oxygen	8.9 mg/L (10th percentile)		
Total Ammonia-N	27 µg/L (summer geomean x 1.74, approximates 90th percentile for small pop.) 19 µg/L (winter geomean x 1.74, approx. 90th percentile)		
Fecal Coliform	28 org./100 ml (summer geomean x 1.74, approx. 90th percentile) 7 org./100 ml (winter geomen x 1.74, approx. 90th percentile)		
Turbidity	5.14 NTU 90th percentile		
Hardness	48.75 mg/L as CaCO3 (10th percentile)		

Arsenic	1.12 µg/L (90th percentile)
Cadmium	0.525 µg/L (90th percentile dissolved)
Chromium	0.415 µg/L (90th percentile dissolved)
Copper	0.86 µg/L (90th percentile dissolved)
Lead	0.06 µg/L (90th percentile dissolved)
Nickel	0.555 µg/L (90th percentile dissolved)
Silver	0.1 µg/L (90th percentile dissolved)
Zinc	2.0 µg/L (90th percentile dissolved)
All Other Metals	0.0 (below detection limits)

BOD_5--Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, the technology-based effluent limitation for BOD_5 was placed in the permit.

The impact of BOD on the receiving water was modeled using simple mixing (as shown in table C3 in Appendix C), at critical condition and with the technology-based effluent limitation for BOD_5 described under "Technology-Based Effluent Limitations" above. A Streeter-Phelps (Dosag) analysis was also run for summer and winter conditions. The Dosag was run with zero BOD input and with a conservative BOD based on high ammonia. Ambient DO was 8.9 mg/L. With initial dilution DO was 8.59 mg/L. With the far field reduction predicted by Dosag the final DO would be 8.58. The DO criterion is 8.0 mg/L. The conservative assumption shows a DO reduction of only 0.01 mg/L which is not enough to put the final DO below the criterion.

Temperature and pH--The impact of pH and temperature were modeled using the calculations from EPA, 1988. The input variables were dilution factor 45, upstream temperature 21.48°C, upstream pH 7.99, upstream alkalinity 53(as mg $CaCO_3$/L), effluent temperature of 22°C was assumed, effluent pH of 6, effluent pH of 9, and effluent alkalinity 150 (as mg $CaCO_3$/L). Effluent temperature appears not to have been monitored since before the 1994 dilution study which used the above effluent temperature. Using simple mixing, the temperature would increase by 0.01°C, which is well below 0.3°C and the maximum pH is already well below the criterion of 9.0 S.U.

The differential between the effluent and ambient temperature is always very small which results in a small amount of energy dissipated into the Columbia. It is not possible at this time to determine if the contribution from all point sources is greater than 1.1°C as specifically stated in the water quality standards for this segment of the Columbia River. This analysis requires a TMDL. As stated earlier in this report, a TMDL is in progress that will attempt to determine temperature allocations for each existing source. Because the Columbia is an interstate waterway with federal hydropower facilities, the TMDL is being conducted by EPA. At this time, the loading from all municipal point sources appears to be very small compared to the solar heating in the reservoirs and some of the industrial sources. “The dams appear to be the major cause of warming of the temperature regimes of the rivers.” (EPA, 2001)

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, the technology-based effluent limitations for pH was placed in the permit and temperature was not limited.

Fecal coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 45.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit. With UV disinfection and proper maintenance, the Permittee should have no problem meeting the water quality criteria for fecal coliform.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: ammonia, and heavy metals. The Permittee also examined 78 priority pollutant chemicals that were required in the application and all were below detection. A reasonable potential analysis (See Appendix C, Table C2) was conducted on the ammonia and metals to determine whether or not effluent limitations would be required in this permit.

A winter critical condition and a summer critical condition were examined. The only parameter that appeared to have a reasonable potential for violating water quality standards was ammonia. The parameters used in the critical condition modeling are as follows: summer acute dilution factor 8 , summer chronic dilution factor 45, winter acute dilution factor 7, winter chronic dilution factor 24, receiving water hardness of 48.75, summer pH of 7.99, and winter pH of 8.46. The high pH appears to be a driving factor along with the high effluent ammonia detected over the last two years of operation. The 90^{th} percentile ammonia concentration was 37 mg/L in the summer and 39.1 mg/L in the winter from 2002 through 2003. The reasonable potential analysis shows that ammonia is likely to violate water quality standards in both the summer and winter.

A permit limit was calculated for both summer and winter ammonia (See Appendix C, Table C4). These calculations show:

Ammonia limits

Season of limit	Average Monthly	Maximum Daily
Summer Limit (June – Sept)	20 mg/L	41 mg/L
Winter Limit (Oct – May)	7 mg/L	15 mg/L

Because the Camas facility has the ability to nitrify and denitrify to remove ammonia, it should have no trouble meeting these limits. Data from January 2001 through March of 2002 shows the facility is able to operate in such a manner as to remove ammonia.

Water quality criteria for metals in Chapter 173-201A WAC are based on the dissolved fraction of the metal.

The Permittee may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may be adjusted on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Metals criteria may also be adjusted using the water effects ratio approach established by USEPA, as generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

Valid ambient background data and effluent data were available for arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc. Ambient data was not available on selenium, and thallium, therefore a background of zero was assumed. The lowest dilution factors of 7 for acute and 24 for chronic were used. Calculations using all applicable data resulted in a determination that there is no reasonable potential for the discharge of these metals to cause a violation of water quality standards. All other metals were assumed to be below detection. This determination assumes that the Permittee meets the other effluent limits of this permit.

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sub lethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, $EC_{50,}$ IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Department Publications Distribution Center (360) 407-7472 for a copy. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

An effluent characterization for acute and chronic toxicity was conducted during the previous permit term. In accordance with WAC 173-205-060, the Permittee must repeat this effluent characterization for the following reason:

> The Permittee has made changes to processes, materials, or treatment that could result in an increase in effluent toxicity. In accordance with WAC 173-205-060(1), the proposed permit requires another effluent characterization for toxicity. The Permittee has also experienced an increase in industrial discharge and cannot demonstrate that the new source is nontoxic or that the pretreatment program and local limits are adequate to control toxicity from the new source. In accordance with WAC 173-205-060(1), the proposed permit requires another effluent characterization for toxicity.

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the effluent is likely to have chemicals of concern for human health. The discharger's high priority status is based on its status as a major discharger.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's Permit Writer's Manual (Ecology Publication 92-109, July, 1994). The determination indicated that the discharge has no reasonable potential to cause a violation of water quality standards, thus an effluent limit is not warranted.

SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED FEB 1999

Parameter	**Existing Limits (Phase II)**		**Proposed Limits**	
	Avg Monthly	**Avg Weekly**	**Avg Monthly**	**Avg Weekly**
BOD_5	30 mg/L	45 mg/L	20 mg/L	30 mg/L
	955 lb/day	1,432 lb/day	1,017 lb/day	1,525 lb/day
	83% removal		70% removal	
TSS	30 mg/L	45 mg/L	20 mg/L	30 mg/L
	1217 lb/day	1,825 lb/day	1,017 lb/day	1,525 lb/day
	81% removal		70% removal	
Fecal coliform bacteria	200/100 ml	400/100 ml	200/100 ml	400/100 ml
Ammonia	Optimize plan operation for nitrification and monitor		**Avg Monthly**	**Max Daily**
			20 mg/L (summer)	41 mg/L (summer)
			7 mg/L (winter)	15 mg/L (winter)
pH	Shall not be outside the range 6.0 to 9.0		Shall not be outside the range 6.0 to 9.0	

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for effluent temperature is being required to further characterize the effluent. This pollutant could have a significant impact on the quality of the surface water. The Permittee will again be required to test for metals which are recognized as priority pollutants during the last two years of the permit term. Four samples are to be collected using clean sampling methods. This sampling is necessary to assure that new industrial discharges do not contain priority pollutants and that the Camas WWTP can effectively treat the wastewater.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the Department's *Permit Writer's Manual* (July 1994) for an activated sludge plant of greater than 2.0 mgd.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* The laboratory at this facility is accredited for: Ammonia, Biological Oxygen Demand (BOD/CBOD), Dissolved Oxygen, pH, Solids-Total Suspended, and Microbiology—Fecal coliform (count).

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Permittee is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards, WAC 173-201A, and Biosolids Handling regulations covered under WAC 173-308.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by the Department under Chapter 70.95J RCW and Chapter 173-308 WAC. The disposal of other solid waste is under the jurisdiction of the local County Health Department.

PRETREATMENT

Federal and State Pretreatment Program Requirements

Under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986), the Department has been delegated authority to administer the Pretreatment Program [i.e. act as the Approval Authority for oversight of delegated Publicly Owned Treatment Works (POTWs)]**.** Under this delegation of authority, the Department has exercised the option of issuing wastewater discharge permits for significant industrial users discharging to POTWs which have not been delegated authority to issue wastewater discharge permits.

There are a number of functions required by the Pretreatment Program which the Department is delegating to such POTWs because they are in a better position to implement the requirements (e.g. tracking the number and general nature of industrial dischargers to the sewerage system). The requirements for a Pretreatment Program are contained in Title 40, Part 403 of the Code of Federal Regulations. Under the requirements of the Pretreatment Program [40 CFR 403.8(f)(1)(iii)], the Department is required to approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i)].

The Department is responsible for issuing State Waste Discharge Permits to SIUs and other industrial users of the Permittee's sewer system. Industrial dischargers must obtain these permits from the Department prior to the Permittee accepting the discharge [WAC 173-216-110(5)] (Industries discharging wastewater that is similar in character to domestic wastewater are not required to obtain a permit. Such dischargers should contact the Department to determine if a permit is required.). Industrial dischargers need to apply for a State Waste Discharge Permit 60 days prior to commencing discharge. The conditions contained in the permits will include any applicable conditions for categorical discharges, loading limitations included in contracts with the POTW, and other conditions necessary to assure compliance with state water quality standards and biosolids standards.

The Department requires this POTW to fulfill some of the functions required for the Pretreatment Program in the NPDES permit (e.g. tracking the number and general nature of industrial dischargers to the sewage system). The POTW's NPDES permit will require that all SIUs currently discharging to the POTW be identified and notified of the requirement to apply for a wastewater discharge permit from the Department. None of the obligations imposed on the POTW relieve an industrial or commercial discharger of its primary responsibility for obtaining a wastewater discharge permit (if required), including submittal of engineering reports prior to construction or modification of facilities [40 CFR 403.12(j) and WAC 173-216-070 and WAC 173-240-110, et seq.].

Wastewater Permit Required

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

Requirements for Routine Identification and Reporting of Industrial Users

The NPDES permit requires non-delegated POTWs to "take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging to the Permittee's sewerage system." Examples of such routine measures include regular review of business tax licenses for existing businesses and review of water billing records and existing connection authorization records. System maintenance personnel can also be diligent during performance of their jobs in identifying and reporting as-yet unidentified industrial dischargers. Local newspapers, telephone directories, and word-of-mouth can also be important sources of information regarding new or existing discharges. The POTW is required to notify an industrial discharger, in writing, of their responsibilities regarding application for a state waste discharge permit and to send a copy of the written notification to the Department. The Department will then take steps to solicit a state waste discharge permit application.

Requirements for Performing an Industrial User Survey

This POTW has the potential to serve significant industrial or commercial users and is required to perform an Industrial User Survey. The goal of this survey is to develop a list of SIUs and PSIUs, and of equal importance, to provide sufficient information about industries which discharge to the POTW, to determine which of them require issuance of state waste discharge permits or other regulatory controls.

An Industrial User Survey is an important part of the regulatory process used to prevent interference with treatment processes at the POTW and to prevent the exceedance of water quality standards. The Industrial User Survey also can be used to contribute to the maintenance of sludge quality, so that sludge can be a useful biosolids product rather than an expensive waste problem. An Industrial User Survey is a rigorous method for identifying existing, new, and proposed significant industrial users and potential significant industrial users. A complete listing of methodologies is available in the Department guidance document entitled "Conducting an Industrial User Survey."

Duty to Enforce Discharge Prohibitions

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Support by the Department for Developing Partial Pretreatment Program by POTW

The Department has committed to providing technical and legal assistance to the Permittee in fulfilling these joint obligations, in particular assistance with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

OUTFALL EVALUATION

Proposed permit Condition S.10 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to determine if sediment is accumulating in the vicinity of the outfall.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

2001. Columbia/Snake River Temperature TMDL Problem Assessment. USEPA Region 10, Seattle, Washington.

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1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Gray and Osborne, Inc.

1997. City of Camas Wastewater Facility Plan. G&O No. 95723. Seattle, Washington

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Tsivoglou, E.C., and J.R. Wallace.

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2003, March. Paul Pickett, Mike Herold. Department of Ecology. Personal communication regarding the Columbia River temperature TMDL.

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1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on May 4, 2004, in the *Camas-Washougal Post* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on August 17, 2004, in the *Camas-Washougal Post* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Carey Cholski
Water Quality Permit Administrator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30-day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6554, or by writing to the address listed above.

This permit and fact sheet were written by Eric Schlorff.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

CBOD5 – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD5 is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued there under (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

Pass through -- A discharge which exits the POTW into waters of the–State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at (http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Table C1

Calculation Of Ammonia Concentration and Criteria for fresh water. Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

Summer (June - Sept) based on temperature from USGS gages at Washougal 2000-2003. The pH is based on 1994 data from USGS combined with 2002 data from Ecology EAP (7 data points).

INPUT
1. Ambient Temperature (deg C; 0<T<30)
2. Ambient pH (6.5<pH<9.0)
3. Acute TCAP (Salmonids present- 20; absent- 25)
4. Chronic TCAP (Salmonids present- 15; absent- 20)

OUTPUT
1. Intermediate Calculations:
   - Acute FT
   - Chronic FT
   - FPH
   - RATIO
   - pKa
   - Fraction Of Total Ammonia Present As Un-ionized

2. Un-ionized Ammonia Criteria
   - Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)
   - Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)

3. Total Ammonia Criteria:
   - Acute Total Ammonia Criterion (mg NH3+ NH4/L)
   - Chronic Total Ammonia Criterion (mg NH3+ NH4/L)

4. Total Ammonia Criteria expressed as Nitrogen:
   - Acute Ammonia Criterion as mg N
   - Chronic Ammonia Criterion as N

Calculation Of Ammonia Concentration and Criteria for fresh water. Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

Winter (October - May) based on temperature from USGS gages at Warrendale 2000-2003 (winter data not available at Washougal). The pH is based on 1994 data from USGS combined with 2002 data from Ecology EAP (14 data points).

INPUT

1. Ambient Temperature (deg C; 0<T<30)
2. Ambient pH (6.5<pH<9.0)
3. Acute TCAP (Salmonids present- 20; absent- 25)
4. Chronic TCAP (Salmonids present- 15; absent- 20)

OUTPUT

1. Intermediate Calculations:
   Acute FT
   Chronic FT
   FPH
   RATIO
   pKa
   Fraction Of Total Ammonia Present As Un-ionized

2. Un-ionized Ammonia Criteria
   Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)
   Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)

3. Total Ammonia Criteria:
   Acute Total Ammonia Criterion (mg NH3+ NH4/L)
   Chronic Total Ammonia Criterion (mg NH3+ NH4/L)

4. Total Ammonia Criteria expressed as Nitrogen:
   Acute Ammonia Criterion as mg N
   Chronic Ammonia Criterion as N

Table C2: Reasonable Potential Calculation for Ammonia and Metals								
				State Water Quality Standard		Max concentration at edge of...		
	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	**LIMIT REQ'D?**
Parameter	Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	
Ammonia (Summer Dry)	1.00	1.00	27.0000	5370.61	976.98	5370.61	917.60	YES
Ammonia (Winter Wet	1.00	1.00	19.0000	5407.31	1590.59	7562.64	1733.46	YES
Arsenic	1.00	1.00	1.1200	1.96	1.36	2.29	1.39	NO
Cadmium	0.94	0.94	0.5250	0.52	0.52	0.52	0.52	NO
Chromium	0.32	0.86	0.4150	1.44	1.26	1.85	1.34	NO
Copper	1.00	1.00	0.8600	3.68	1.68	4.81	1.76	NO
Lead	0.47	0.47	0.0600	0.26	0.12	0.34	0.12	NO
Nickel	1.00	1.00	0.5550	2.95	1.25	3.90	1.31	NO
Silver	0.85	NA	0.1000	0.27	NA	0.34	NA	NO
Zinc	1.00	1.00	2.0000	13.85	5.46	18.60	5.77	NO

		INPUTS FOR ABOVE REASONABLE POTENTIAL							
	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
Parameter		*Pn*	*ug/L*	*CV*	*s*	*n*			
Ammonia (Summer Dry)	0.95	0.913	36540.00	0.60	0.55	33	1.17	8	45
Ammonia (Winter Wet	0.95	0.956	39100.00	0.60	0.55	67	0.97	7	24
Arsenic	0.95	0.473	2.70	0.60	0.55	4	2.59	7	24
Cadmium	0.95	0.473	0.20	0.60	0.55	4	2.59	7	24
Chromium	0.95	0.473	9.30	0.60	0.55	4	2.59	7	24
Copper	0.95	0.473	8.00	0.60	0.55	4	2.59	7	24
Lead	0.95	0.473	1.20	0.60	0.55	4	2.59	7	24
Nickel	0.95	0.473	6.70	0.60	0.55	4	2.59	7	24
Silver	0.95	0.473	0.60	0.60	0.55	4	2.59	7	24
Zinc	0.95	0.473	33.00	0.60	0.55	4	2.59	7	24

Table C3

Dissolved oxygen concentration following initial dilution.

References: EPA/600/6-85/002b and EPA/430/9-82-011

Based on Lotus File IDOD2.WK1 Revised 19-Oct-93

INPUT	
1. Dilution Factor at Mixing Zone Boundary:	24
2. Ambient Dissolved Oxygen Concentration (mg/L):	8.9
3. Effluent Dissolved Oxygen Concentration (mg/L):	2
4. Effluent Immediate Dissolved Oxygen Demand (mg/L):	0
OUTPUT	
Dissolved Oxygen at Mixing Zone Boundary (mg/L):	8.61

Table C4: Ammonia Limits Calculation

Permit Limit Calculation Summary

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration *ug/L*	Water Quality Standard Acute *ug/L*	Water Quality Standard Chronic *ug/L*	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L
Ammonia (summer dry)	8.0	45.00	1.00	1.00	27.0000	5100.0000	830.0000	**20242.9**	**40611.0**
Ammonia (winter wet)	7.00	24.00	1.00	1.00	19.00	2100.00	470.00	**7270.5**	**14586.0**

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations

Statistical variables for permit limit calculation

WLA Acute *ug/L*	WLA Chronic *ug/L*	LTA Acute *ug/L*	LTA Chronic *ug/L*	LTA Coeff. Var. (CV) *decimal*	LTA Prob'y Basis *decimal*	Limiting LTA *ug/L*	Coeff. Var. (CV) *decimal*	AML Prob'y Basis *decimal*	MDL Prob'y Basis *decimal*	# of Samples per Month *n*	
40611	36162.00	13039.5	19073.0	0.60	0.99	13039.5	0.60	0.95	0.99	4.00	1.00
14586	10843.00	4683.3	5719.0	0.60	0.99	4683.3	0.60	0.95	0.99	4.00	1.00

Table C5

Calculation of pH of a mixture of two flows.

Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

INPUT	
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	45.000
1. UPSTREAM/BACKGROUND CHARACTERISTICS	
Temperature (deg C):	21.43
pH:	7.99
Alkalinity (mg CaCO3/L):	53.00
2. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	22.00
pH:	7.64
Alkalinity (mg CaCO3/L):	150.00
OUTPUT	
1. IONIZATION CONSTANTS	
Upstream/Background pKa:	6.37
Effluent pKa:	6.37
2. IONIZATION FRACTIONS	
Upstream/Background Ionization Fraction:	0.98
Effluent Ionization Fraction:	0.95
3. TOTAL INORGANIC CARBON	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	54.28
Effluent Total Inorganic Carbon (mg CaCO3/L):	158.03
4. CONDITIONS AT MIXING ZONE BOUNDARY	
Temperature (deg C):	21.44
Alkalinity (mg CaCO3/L):	55.16
Total Inorganic Carbon (mg CaCO3/L):	56.58
pKa:	6.37
pH at Mixing Zone Boundary:	7.96

Table C6: PREDICTED DILUTIONS FOR THE CITY OF CAMAS

Model Run	**Ambient Conditions**				**Effluent Conditions**						**Final Centerline Dilution**	
					Flow Rate (mgd)							
New 2004	**River Discharge Rate (cfs)**	**Discharge Depth ft (m)**	**Current Speed (m/s)**	**Amb. Temp (deg C)**	**Chron Dry**	**Acut Dry**	**ChronWet**	**Acut Wet**	**Max (2015)**	**Eff. Temp (deg C)**	**Acute Dilution (32 feet)**	**Chronic Dilution (321 feet)**
NC1	81,400	21.0 (6.4)	0.26	21.48	1.55					22.0		**<u>45</u>**
NC2						**2.195**					**<u>8</u>**	
NC8	192,200	26.6 (8.1)	0.58	15.13			2.98			10.0		60
NC9								5.632			9	
NC10									7.8		10	43
NC13				4.6			2.98			10.0		33
NC14								5.632			8	
NC15									7.8		10	49
NC18				**12.6**			2.98			16.0		44
NC19								5.632			9	
NC20									7.8		10	38
NC22B	522,000	40.9 (12.5)	0.99	12.6			2.5			16.0		**<u>24</u>**
NC24								5.632			**<u>7</u>**	
NC25									7.8		8	37

TABLE C7: MODEL RUNS NOT RELEVANT

Model Run	**Ambient Conditions**				**Effluent Conditions**						**Final Centerline Dilution**	
					Flow Rate (mgd)					**Eff. Temp (deg C)**		
New 2004	**River Discharge Rate (cfs)**	**Discharge Depth ft (m)**	**Current Speed (m/s)**	**Amb. Temp (deg C)**	**Chron Dry**	**Acut Dry**	**Chron Wet**	**Acut Wet**	**Max (2015)**		**Acute Dilution (32 feet)**	**Chronic Dilution (321 feet)**
NC2A	81,400	21.0 (6.4)	0.26	21.48		**2.195**				22.0	5	
NC3							2.98					49
NC4								5.632			11	
NC5									7.8		12	39
NC6	192,200	26.6 (8.1)	0.58	15.13	1.55					10.0		63
NC7						**2.195**					5	
NC11				4.6	1.55					10.0		18
NC12						2.195					5	
NC13A							2.98					18
NC16				**12.6**	1.55					16.0		59
NC17						2.195					5	
NC21	522,000	40.9 (12.5)	0.99	12.6	1.55					16.0		27
NC22						2.195					1.7	
NC22A						2.195					3.8	
NC23							2.98					24
NC24A								5.632			3	

NC2A, NC13A, NC22A and NC24A were model runs with all 16 diffuser ports open. All other runs have only 8 ports open.

MODEL RUNS NOT USED FOR CAMAS

The following model runs were not found to be relevant because of a variety of reasons (see table C7). Model runs NC2A, NC13A, NC22A, and NC24A were model runs with all 16 diffuser ports open. The diffuser currently has only half of the diffuser ports open. All runs in table C6 above have only 8 ports open. During the summer low river flows, only the low effluent flows of 1.55 and 2.195 were kept in table C6 of the predicted dilution factors as required in the Department dilution guidance. The model runs shown in table C7 representing higher effluent flows were determined unlikely to occur during the summer low flows. Likewise, the model runs that represented low effluent flows were unlikely to occur during the winter and spring months when the ambient river flows were higher. Therefore, only the flows at 2.98, 5.632, and 7.8 mgd were kept in table C6. Model Run NC22B shown in table C6 represents the effluent flow expected in the spring (February – May) run-off period and is based on the maximum day flow for that period. Therefore the model run using 2.195 mgd was not displayed in table C6.

CONSIDERATIONS FOR DILUTION MODELING

The dilution ratios were recalculated due to changes in the guidance for dilution modeling that the Department of Ecology uses. When the modeling was last conducted in 1994, Ecology allowed flux average dilution for chronic boundary dilution. Ecology uses centerline dilution for both the acute and chronic boundaries in unidirectional waters. The original current velocity analysis conducted for the 1994 CH2M Hill report shows unidirectional flow. A dilution study conducted for the City of Vancouver also showed unidirectional water. The 1994 analysis for Camas used the UDKHDEN model. UDKHDEN was used for the Salmon Creek POTW discharge downstream of Camas and the model was found to slightly over predict dilution compared to the UM3 model based on a dye study and dilution modeling. The UDKHDEN model appears to do a better job of predicting the dilution factor when there are a lot of obstructions such as boulder and pilings in the river. Therefore the UM3 model was run in March 2004 using visual plumes. A port contraction coefficient of 0.61 was used because the ports were considered to be sharp edged. The results are shown in the above tables C6 and C7.

Following public comments in September2004, the dilution models were reexamined and a couple of errors were found. These errors were limited to an incorrect port spacing and port depth used in the following runs: NC1, NC2, NC8, NC9, NC19, NC20, NC22B, NC24, and NC25. These errors were not in the ambient or effluent conditions shown in table C6 but rather in not using these same conditions through out the model runs. These model runs were rerun and resulted in one or two points in each dilution factor. In a couple of cases the dilution went down when the port depth should have been in shallower water.

How the mixing zone model inputs were derived

Ambient Flow

The 1994 analysis of river discharge rate, discharge depth, and current speed (velocity) for Camas in 1994 appeared to be reasonable and should not have changed over time. The first discharge rate of 81,400 cfs is the 7Q10 flow and represents the dry season flow. The discharge depth of 21.0 feet (6.4 m) is the calculated depth at that flow. The current speed of 0.26 m/s was determined from drift card observations and is shown in the 1994 report. The median flow of 0.58 m/s and the winter maximum flow of 0.99 m/s were also taken from the 1994 report.

Ambient Temperature

The 21.48º C summer water temperature (June-September) represents a recalculation using Summer temperatures from July through October from the Army Corps of Engineers (ACOE) and USGS dissolved gas data base for Washougal. This temperature data may be found at: http://oregon.usgs.gov/projs_dir/pn307.tdg.

The summer maximum temperature of 21.48º C is based on a 90th percentile of daily maximums and used 453 data points from 2000-2003. All of the ambient temperature data was recalculated using ACOE/USGS data rather than use the 1994 data. Winter temperature data is not available at the Washougal station; therefore, data from the Warrendale station were used instead. This appears to be the only temperature station operating in this section of the river during the winter months. The 15.13ºC is a winter maximum which was determined using a 90th percentile of daily maximums from October through May for 2000 through 2003 and represents 728 data points. The yearly average of 12.6ºC was determined as a mean of daily means for all temperatures from October 2000 through September 2003 and represents 1,125 data points. The winter low of 4.6ºC was determined as 5th percentile of daily minimums from October through May for 2000 through 2003.

Effluent Flows

The effluent flows were recalculated because conditions at the plant have changed (plant upgraded in 2000) and the flows could be determined from discharge monitoring records (DMRs). The Department guidance requires that the flow-rate to use depends on how close to design capacity the plant is presently operating. The facility is operating at less than 85 percent of design flow; therefore, the flow-rate we used for the acute boundary is the highest daily maximum plant effluent flow for the past three years during the season in which the critical condition is likely to occur. The summer critical season was based on the daily maximum flow for June to September of 2000 to 2003 which was 2.195 mgd. The winter maximum flow for October through May of 2000 to 2003 was 5.632 mgd.

The POTW flow rate corresponding to the calculation of the chronic mixing zone ratio is: the highest monthly average plant flow for the past three years during the season in which the critical condition is likely to occur. During the summer the maximum average monthly flow would be 1.55 mgd. The winter maximum average monthly flow was 2.98 mgd which was used for the 1994 study. We also included the maximum projected flow the plant was designed to handle by 2015 which was 7.8 mgd. This maximum projected flow of 7.8 mgd was also used in the new analysis. Because this 7.8 mgd is a maximum flow expected only during winter months, model runs using this flow were eliminated from the summer acute and chronic results shown in table C6 above.

Effluent Temperature

The effluent temperatures were borrowed from the 1994 study because temperature has not been monitored regularly at the upgraded plant and the original values appear reasonable. These values include: 22.0ºC for the summer maximum, 10.0ºC for the winter minimum, and 16.0ºC for the average temperature.

Dilution Ratios Based on Updated Modeling Results:

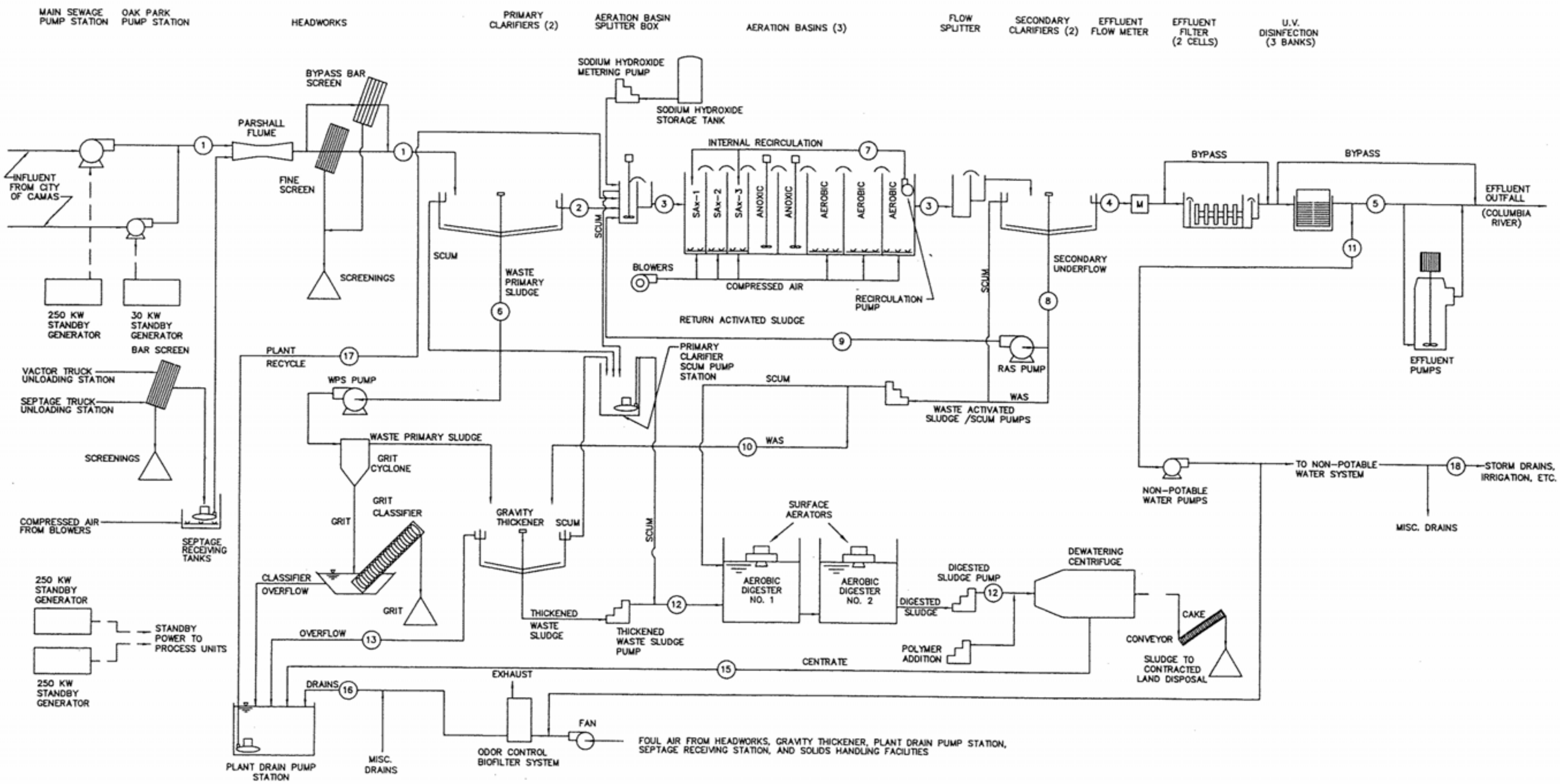
The dilution values are derived using the best modeling tool currently available together with updated values for effluent conditions as described in the preceding paragraphs. These values are:

Condition	Dilution Factor	POTW flow (mgd)	River Flow (cfs)	River Velocity (m/s)	Number of Ports open
Summer acute	8	2.195	81,400	0.26	8
Summer chronic	45	1.55	81,400	0.26	8
Winter acute	7	5.632	522,000	0.99	8
Winter chronic	24	2.5	522,000	0.99	8

During the critical summer condition, the river was at the 7Q10 flow and effluent flows were reasonably low at the max monthly average flow of 1.55 mgd and the max daily flow of 2.195 mgd for the summer for a dilution value of 8:1. The lowest chronic value observed in the model runs for the summer season was 45:1.

The lowest acute dilution factor occurring during the winter season was 7:1. This value occurred when the ambient flow was highest and when plant flow was matched with the winter maximum daily flow of 5.632 mgd and average yearly temperatures. The lowest chronic flow during the winter season was 24:1 which occurred when the ambient flow was at a maximum, ambient and effluent temperatures were median and effluent flow was at 2.5 mgd. The effluent flow of 2.5 mgd represents the average daily flow for the months of February through May when the spring floods occur. The maximum daily effluent flow during this same spring period is 5.632 mgd.

The difference between 8 ports open and all 16 open: 8 ports appears to show an increase in acute dilution and a reduction in chronic dilution in almost all cases. This difference is a few points for both acute and chronic. A difference of a few points in the chronic factors does not make as big a difference as a few point does in the acute factors, e.g., model runs for acute dilution NC24 and NC24A where 6.5.



WATER BALANCE

1 INFLUENT Q = 6.10 MGD
2 PE Q = 6.047 MGD
3 MIXED LIQUOR Q = 8.236 MGD
4 SE Q = 6.177 MGD
5 EFFLUENT Q = 6.01 MGD
6 WPS Q = 0.053 MGD
7 IR Q = 13.5 MGD
8 SEC. UNDERFLOW Q = 2.059 MGD
9 RAS Q = 2.024 MGD
10 WAS Q = 0.035 MGD
11 NPW Q = 0.168 MGD
12 TWS Q = 0.02 MGD
13 THICKENER OF Q = 0.068 MGD
14 DEWATERED CAKE Q = 0.002 MGD
15 CENTRATE Q = 0.018 MGD
16 DRAINS Q = 0.079 MGD
17 PDD Q = 0.165 MGD
18 UNRECOVERED NPW Q = 0.089 MGD

DESCRIPTION OF PROCESS

Influent wastewater is measured, sampled and screened at the headworks. Primary clarifiers remove sludge and grit. The primary effluent flows to aeration basins designed for nitrogen removal, with selectors, anoxic zones, and internal recycle. Secondary effluent passes through a cloth disc filter and a UV disinfection channel before discharge to the Columbia River. Effluent pumps are available for use in high river flow periods. Primary sludge and WAS are co-thickened in a gravity thickener and pumped to aerobic digesters. Digested sludge is dewatered using a centrifuge and hauled off-site for land application.

LEGEND

IR	INTERNAL RECYCLE
OF	OVERFLOW
PDD	PLANT DRAIN PUMP DISCHARGE
PE	PRIMARY EFFLUENT
RAS	RETURN ACTIVATED SLUDGE
SE	SECONDARY EFFLUENT
TWS	THICKENED WASTE SLUDGE
WAS	WASTE ACTIVATED SLUDGE
WPS	WASTE PRIMARY SLUDGE

CITY OF CAMAS
NPDES PERMIT APPLICATION
FIGURE 2
PROCESS FLOW SCHEMATIC

Gray & Osborne, Inc.
CONSULTING ENGINEERS

APPENDIX D--RESPONSE TO COMMENTS

On September 20, 2004, the following comments were received by the City of Camas, Department of Public Works. The responses represent the Department's review and action.

Comments on the Permit

Comment 1:

Page 1, Delete "Extended air" from the Plant Type description. The treatment plant activated sludge process is not an extended air process.

Response:

This change will be made to the permit.

Comment 2:

Page 6, Section S1.A: No effluent limitations for ammonia should be included in the permit, based on a lack of reasonable potential to exceed water quality standards using the CORMIX mixing zone model for the treatment plant diffuser. See also Comment No.15 below.

Response:

The Department disagrees that the UM3 model used was in error and will address this issue under point 15. Therefore the ammonia limit will remain.

Comment 3:

Page 7-8, Section S2.A. Monitoring Schedule: The expanded monitoring requirements in the draft permit are not justified and would significantly burden the City with additional capital (incubators and other test apparatus) and labor (greater than 0.25 additional FTE) costs. The superior record of O&M performance and the history of compliance by the City's treatment plant and its operations staff indicate that current levels of monitoring are adequate. Larger treatment facilities in this state are required by their NPDES permits to monitor parameters such as BOD, TSS, and ammonia on a schedule of three times per week, yet this draft permit requires the City to monitor these parameters five times per week. The City requests that the frequency of testing for these influent and effluent constituents be reduced from the level in the draft permit. Plant operating staff has also estimated that the cost of additional equipment needed to perform the added testing is in the range of $10,000. Operating staff has also raised concerns with regard to the additional lab time taking them away from other important maintenance functions that are required to operate and maintain the plant at its peak efficiency. Increasing the lab testing frequencies will cause other areas of the operation to shift downward on the priority list for the operating staff.

Response:

The City of Camas WWTP has a design capacity of 6.10 mgd. The Department policy for monitoring requires plants to monitor five times per week for BOD and TSS when the facility has a design capacity of greater than 5.0 mgd. The Department has reviewed the City's performance and determined that the City's performance on BOD & TSS over the last two years is good. However, Camas is grown and has one of the largest percentages of industrial flows for any of our municipal facilities. This industrial wastewater has great potential to cause upset in the plant which could cause a BOD or Ammonia violations. Therefore, the Department will reduce the monitoring frequency from five (5) days per week to four (4) days per week for BOD, TSS, and Ammonia.

Comment 4:

Page 8, Section S2.A: In the "Pretreatment" category, the priority pollutant scan for non-metals should indicate that the sample for sludge will be a grab sample rather than a 24-hour composite.

Response:

This change will be made to the permit.

Comment 5:

Page 8, Section S2.A: In the "Wastewater Effluent" category, the "Parameter" should be listed as "Oil and grease, priority pollutant metals, and cyanide" rather than "Oil and grease, priority pollutant metals, and cyanide."

Response:

This change will be made to the permit.

Comment 6:

Page 8, Section S2.A: In the "Sludge" category, the parameter should be listed as "priority pollutant metals," rather than "priority pollutants metals." Units should be "mg/kg", not "ug/L."

Response:

This change will be made to the permit.

Comment 7:

Page 12, Section S4.A: The footnote in the Design Criteria incorrectly limits the plant treatment capacity at influent ammonia concentrations greater than a certain percentage of the influent BOD5 concentration. We assume that this limit is based on a perceived inadequacy by the Department of the design capacity of the plant's blower and aeration system to handle higher ammonia loads. This proposed limit does not consider additional system capacity due to cell uptake of ammonia, BOD5 removal in the anoxic denitrification zone, allowable ammonia residual in the effluent, excess blower capacity at actual backpressures, and excess oxygen transfer efficiency provided by the actual diffuser system. It is requested that this limit be deleted from the permit. High loadings of ammonia, such as from industrial sources, will be limited by pretreatment requirements if these loadings are limiting the plant's ability to maintain adequate dissolved oxygen in the treatment process.

Response:

The footnote referred to in this comment in essence requires that BOD capacity be reduced by a factor equal to about four pounds of BOD for every pound of ammonia over 20 percent of the

BOD loading concentration. This reflects the level at which our experience tells us that ammonia concentrations would exceed domestic loadings for this pollutant. The condition is needed because the POTW was designed to accommodate wastewater essentially domestic in strength and nature. Section S4 recognizes the BOD loading capacity anticipated, but did not include the ammonia capacity the POTW was designed to treat. This was done to provide the POTW additional flexibility to accept higher ammonia loadings, but the oxygen demanding effects of accepting such loadings still need to be recognized. Additional ammonia loadings accordingly reduce the POTWs ability to accept other oxygen demanding pollutants (carbonaceous BOD). Presently the POTW is receiving a high proportion of its ammonia loadings from a semiconductor manufacturer. The POTW must treat both BOD and ammonia by its permit, and both require the oxygenation of wastewater. Therefore, both carbonaceous BOD loadings and ammonia loadings are competing for the oxygen delivery capacity of the treatment plant.

In addition, the footnote in S4 relating to the capacity allows that the Permittee would begin reducing its BOD capacity when ammonia exceeded 20 percent of the rated BOD capacity. This means that the rated BOD capacity of 5,616 lb/day would be reduced when ammonia loadings to the POTW exceed 1,120 lbs/day. The Permittee (in comment 6) argues that adjustment should be made to account for certain other mechanisms in which ammonia uptake is realized. The Permittee (in comment 11) notes that the design nitrogen loading is 942 lbs/day TKN, not 1,017 lbs/day ammonia. Since TKN is the sum of ammonia and organic nitrogen, and is measured as a weight of nitrogen, it would normally be higher than the ammonia concentration as ammonia is normally about 60 percent of influent TKN, and organic nitrogen comprises the other 40 percent. Therefore, the 942 lbs/day TKN equates to about 565.2 lbs/day of ammonia-N, or (17/14)*565.2 = 686 lbs/day of ammonia (when reported as a weight of the ammonia molecule rather than the nitrogen atoms in the ammonia molecule). Therefore, allowing ammonia loadings to equal 20 percent of BOD rated capacity before reducing raw BOD loading capacity is already quite generous, and doesn't require further upward adjustment in the Department's opinion.

<u>Response to Specific Portions of This Comment (In Order)</u>:

<u>Comment 8a</u>:

"We assume that this limit is based on a perceived inadequacy by the Department of the design capacity of the plant's blower and aeration system to handle higher ammonia loadings."

<u>Response</u>:

The Department perceives no deficiency in the POTWs ability to accommodate its rated flow and loadings, however, the rated ammonia loading is representative of the anticipated domestic load at the rated flow and BOD loading of the POTW. The permit condition requires the POTW to accordingly reduce its BOD capacity if it desires to allow higher than domestic ammonia loadings. Such additional ammonia loadings were not anticipated when the POTW was designed.

<u>Comment 8b</u>:

"The proposed limit does not consider additional system capacity due to cell uptake of ammonia."

<u>Response</u>:

When the POTW was designed, the design rating did allow a factor for cell uptake of ammonia, however when additional ammonia is added (through industrial discharges), additional cell uptake of ammonia does not occur beyond that already anticipated. Therefore, while its appropriate to reduce aeration requirements for a portion of the ammonia because some ammonia is used by cell production, this consideration has already been accounted for in the design loading for ammonia. The additional ammonia loadings don't spur more cell growth, and therefore such loadings should not be reduced for (bacteria) cell uptake.

Comment 8c:

"The proposed limit does not consider additional system capacity due to... …BOD5 removal in the anoxic denitrification zone…".

Response:

Under anoxic conditions, nitrates are reduced to nitrogen gas when the oxygen from the nitrate molecules are used as a source of oxygen for digestion of carbonaceous BOD. The POTW was constructed as a step-feed system, with the ability to be run in a mode where raw wastewater is introduced at a point where ammonia had been nitrified (oxidized) to nitrates, and the denitrification process could occur. During our inspections, the facility has not been employing the step-feed system to denitrify its effluent (and the POTW is not required to do so or to produce a de-nitrified effluent). If the POTW is operating in a denitrifying mode, and can show consistent total nitrate levels of 10 mg/L or less, it would be strong evidence that denitrification has been successfully employed. Then if they can project how they would continue to employ this process at their rated flow and loading rates, Ecology would be hard pressed not to consider this evidence, especially if it were part of a comprehensive POTW re-rating. To date such evidence has not been provided.

Comment 8d:

"The proposed limit does not consider additional system capacity due to... …allowable ammonia residual in the effluent…".

Response:

The POTW would need to nitrify to meet current ammonia limits even if there were no non-domestic sources of ammonia. Therefore, the Department presumes that additional ammonia loadings in the POTWs influent directly relate to either increases to the effluent concentrations or loadings that must be removed by the treatment process (through aeration). Again, what we are talking about is the loadings of ammonia over and above what domestic wastewater would contain.

Comment 8e:

"The proposed limit does not consider additional system capacity due to... …excess blower capacity at actual backpressures…".

Response:

The City has provided no evidence to support the inference that backpressures are less than their designer presumed they would be when the POTW was designed. The vast majority of blower backpressure is due to the depth of water above the diffusers in the aeration basin. Even if the POTW built aeration basins shallower than plans showed, there would be no need to revisit the presumptions used. If aeration basins were shallower, the oxygen transfer efficiency would proportionately decrease, and there still would not be a net increase in oxygen delivery capacity. The comment provides no rationale for adjusting the backpressures used in designing this POTW. Even were the diffuser backpressures measured, and were less than what the designer presumed, aerators are subject to fouling over time, and the rating provided for this POTW is based on anticipating a degree of reduced performance for fouling.

Comment 8f:

"The proposed limit does not consider additional system capacity due to... ...excess oxygen transfer efficiency provided by the actual diffuser system."

Response:

The City has provided no evidence of any kind to support the inference that the oxygen transfer efficiency might be greater than their designer presumed it would be when the POTW was designed. If the POTW wishes to engage in a facility rerating, then the procedures outlined in the Department's "Criteria for Sewage Works Design", Ecology, 1998, need to be followed. No data has been provided to the Department that allow for such an assessment, and no desire for a facility rerating has been expressed to date. The Department finds that there is equal basis to speculate that the oxygen transfer efficiency may be lower than presumed in the design of this facility.

Comment 8g:

"It is requested that this limit be deleted from the permit."

Response:

The proposed footnote is not a limit, but a mechanism for adjusting the rated capacity of the POTW. It is needed as significant non-domestic loadings of oxygen demanding pollutants are anticipated to be discharged to this POTW, and it is necessary to account for the amount of the POTWs oxygen delivery capacity required for their treatment.

Comment 8h:

"High loadings of ammonia, such as from industrial sources, will be limited by pretreatment requirements if these loadings are limiting the plant's ability to maintain adequate dissolved oxygen in the treatment process."

Response:

The Department administers a pretreatment permit for each of the principal non-domestic dischargers to the POTW. The Department's permits will continue to reflect the loading limits for oxygen demanding pollutants (BOD and ammonia) which the City agrees to accept from these sources of indirect discharges to the POTW. Other agreements by the City such as user contracts should be in place to provide the ability of the POTW to respond to more immediate problems at the POTW. The Department is glad to have this confirmation that such authorities and mechanisms exist. They are, however, not proactive measures to prevent non-compliance. Once the POTW finds that agreed-to loadings from industries and domestic sources are too much for the POTW to handle, it may take several years to install additional capacity at the POTW. The effects of additional ammonia loadings on the POTWs BOD capacity can easily be anticipated through the means spelled out in the footnote in question. The Department's position is that such problems should be avoided wherever possible. The intent of this footnote is to do just that, and our review finds that the draft wording is appropriate.

Comment 9:

Fact Sheet, Page 1: Delete "extended air" from Type of Treatment description in table.

Response:

This change will be made to the permit.

Comment 10:

Fact Sheet, Page 2, 1st paragraph: Delete "extended air" in first sentence. Regarding 2nd sentence, either lime slurry or sodium hydroxide will be used to adjust pH (operator's option). The primary clarifiers are not used to mix the lime slurry or sodium hydroxide. The application and mixing points are either downstream of the influent Parshall flume or at the aeration basin splitter box.

Response:

This change will be written into the permit.

The following comments were made on the fact sheet.

Comment 11:

Fact Sheet, Page 2, last paragraph, 2nd sentence: The selector zones are followed by two anoxic mixing zones.

Response:

This change will be written into the Fact Sheet.

Comment 12:

Fact Sheet, Page 3, 2nd paragraph, last sentence: There are a total of 288 UV lamps.

Response:

This change will be written into the Fact Sheet.

Comment 13:

Fact Sheet, Page 7, Table 2: The nitrogen design loading is 942 lbs/day TKN, not 1,017 lbs/day ammonia.

Response:

This change will be made to the Fact Sheet. The Permittee should note that this line was not carried over into the permit.

Comment 14:

Fact Sheet, Page 8, last line: Plant design loading is 5,616 lbs/day, not 5.616 lbs/day.

Response:

This change will be made to the permit.

Comment 15:

Fact Sheet, Page 18: The Proposed Limits for TSS (30/45 mg/L) in the Effluent Limits table do not agree with the effluent limitations in section S1 of the permit, page 6.

Response:

The permit was correct. The permit was finished after the fact sheet and the fact sheet will need to be changed to show what is now in the permit. The limits in the permit for both BOD and TSS were reduced to 20 mg/L and 30 mg/L to recognize the fact that the facility could produce a BOD and TSS in the effluent even though the influent removal rate was decreased for dilute influent.

Flows from semi-conductor industries in Camas have slowly ramped up to the point where they are up to 38 percent of flows in some months. The concession of requiring only a 70 percent removal rate for BOD and TSS was based on the presumption that such flows would eventually consume up to 52 percent of the POTWs flows at their 6.1 MGD design capacity (for the currently constructed phase). Therefore, the flows are in line with the prior analyses in this regard.

With respect to I&I, our analysis showed that over the past year, I&I flows have been as much as 45 percent of monthly average flows (January 2004). When dilute flows from semi-conductor industries are subtracted from the equation, I&I flows in this month were 1.2 MG of the remaining 2.14 MG of flows. This means that I&I flows of 1.2 MGD exceeded domestic flows of 0.94 MG, and far exceeded our target of 40 percent or less of domestic flows (at ~130 percent). Therefore, the I&I requirements of this permit are an essential component of future management of the wastewater infrastructure in this community.

Comment 16:

Fact Sheet, Page 30: An ambient river pH of 8.0 should be used for winter conditions for the un-ionized ammonia and reasonable potential calculations. A pH of 8.0 was used for the un-ionized ammonia and reasonable potential calculations for the Salmon Creek WWTP outfall in similar calculations performed earlier in 2004. This value is based on data taken at Ecology Station 28A100 with modern monitoring techniques in 2002-2003. A pH of 8.46, based on data collected in 1994, does not reflect current conditions.

Response:

The Department disagrees with this assessment. The Department thinks the analysis conducted by USGS in 1994 is of high quality and should be used along side of the Department 2002-2003 data. It is unfortunate that the only recent data available on pH is very limited. Because of the small populations in both data sets, the Department thought it would be best to combine the data. The high pH values seen in 1994 were of concern and although the pH in 2002 is lower, it is still high. The Department does not want to base the important calculations for ammonia toxicity on one year of data when it is known that pH has been high in the past. Permit writers must consider the worst case scenario to protect the aquatic life. If is the 1994 data reflects the pH in the Columbia at certain times, it is a serious condition when ammonia is present. The comment above also quotes the Salmon Creek permit which is in the process of being re-written. It is likely that Salmon Creek and Vancouver Marine Park NPDES permits will use this same analysis of pH and will therefore likely use the pH of 8.46 for reasonable potential calculations. This pH value represents the best information we have at this time and the value will be used as is in the new permit. During the next permit cycle, the Permittee may want to have a program to sample the ambient water on a regular basis for pH in a study that has quality control and quality assurance. A sampling program where pH has been sampled more than twice per month over two years would be most beneficial to each of the Permittees involved.

Comment 17:

Fact Sheet, Page 37: The 1994 Wastewater Facilities Plan for the City of Camas analyzed the treatment plant discharge diffuser with the computer software model UDKHDEN. As reported in the current Fact Sheet, the Washington State Department of Ecology (WDOE) in 2004 ran a new series of modeling scenarios utilizing the UM3 model. According to WDOE the reason for changing the model was that UDKHDEN "tends to over predict the dilution compared to the UM3 model for these waters. The model also used a flux average model prediction rather than a centerline prediction which is recommended in the Department guidance for unidirectional water."

The UM3 model was run 25 times by WDOE for both critical summer and critical winter season conditions. These runs produced four dilution factors that [were] used in the following situations:"

	Acute	**Chronic**
Aquatic Life (summer)	8	48
Aquatic Life (winter)	5	22
Human Health, Carcinogen		22
Human Health, Non-carcinogen		22

The City's consultant, Gray & Osborne, Inc., modeled the City of Camas diffuser using the CORMIX mixing zone model with the identical input values used by WDOE based on the draft NPDES Permit, Fact Sheet, and hard copy UM3 model runs provided by WDOE (see attached CORMIX model run data). In addition, Gray & Osborne checked their CORMIX model results by having Dr. Robert Doneker, P.E., (Portland State University) a developer of the CORMIX model, independently model the Camas diffuser (see Dr. Doneker letter attached). The dilution results are characterized below for both the UM3 and CORMIX models based on *Table C6: Predicted Dilutions for the City of Camas*, contained within the NPDES Fact Sheet.

Model Run	**Discharge Season**	**UM3**		**CORMIX**	
		Acute Dilution (32 feet)	**Chronic Dilution (321 feet)**	**Acute Dilution (32 feet)**	**Chronic Dilution (321 feet)**

NC1	Summer		48	501	662
NC2	Summer	8		354	470
NC8	Winter		60	80	549
NC9	Winter	**5**		92	332
NC10	Max.	11	43	89	263
NC13	Winter		33	746	1,013
NC14	Winter	8		396	537
NC15	Max.	10	49	287	388
NC18	Winter		44	746	1,013
NC19	Winter	9		396	537
NC20	Max.	11	38	287	388
NC22B	Winter		**22**	*>1,000	*>2,000
NC24	Winter	6		1,023	1,472
NC25	Max.	7	33	739	1,064

*Estimated dilution values

In the model run NC22B, the input parameters of the small discharge velocity relative to the high ambient velocity will provide wake-like conditions without any jet mixing. This wake attachment is a dynamic interaction of the effluent plume with the bottom that is forced by the receiving water crossflow. This is an actual physical condition that occurs with these input variables. The UM3 model or other similar models do no have the capability to predict that this process is even occurring. The dilution values derived from the UM3 modeling for model run NC22B are not valid since UM3 is not capable of modeling this known physical process.

The two model results are drastically different and would indicate that effluent ammonia limits are not necessary due to the significant increase in dilution as shown by the CORMIX model results. The following table shows the respective minimum dilution values for both a critical summer and critical winter season.

Discharge Season	**UM3**		**CORMIX**	
	Acute Dilution (32 feet)	**Chronic Dilution (321 feet)**	**Acute Dilution (32 feet)**	**Chronic Dilution (321 feet)**
Summer	8	48	354	470
Winter	5	22	80	332
Human Health, Carcinogen		22		332
Human Health, Non-carcinogen		22		332

Please note that UM3 uses a jet-integral model for near field mixing, which should only be applied to a stable near-field without dynamic attachments. Stable discharge conditions usually occur with a combination of strong buoyancy, weak momentum and deep water. The location of the City of Camas diffuser in the Columbia River is conducive to recirculation phenomena of unstable discharge conditions, created by shallow water and low buoyancy, near-horizontal discharges. This local recirculation leads to re-entrainment of already mixed water back into the buoyant jet region. Boundary interactions control discharge stability in the vicinity of the discharge. The CORMIX model accounts for both vertical and lateral boundaries, which are always present in the Columbia River. Determination of flow stability is particularly important for near-field mixing of riverine discharges. The UM3 model does not address the effects of vertical or horizontal boundaries or the stability of the discharge. It assumes the ambient water body is infinite. Therefore, use of the CORMIX model is recommended for modeling the Camas diffuser.

Response:

The Department does not agree that the UM3 (Visual Plumes) is the wrong model to use for this section of the Columbia. The UM3 and UDKHDEN models were used in other permits in this stretch of the Columbia River. The UM3 model was shown to better match the dilution observed during a dye study for the Salmon Creek outfall. The Salmon Creek outfall diffuser is in similar shallow conditions as the Camas outfall. The Vancouver Marine Park outfall and diffuser was also modeled and a dye study was conducted to calibrate the model. The UDKHDEN model was used and fit well with the dye study data. At this time there is no reason to believe that CORMIX will do a better job in modeling the discharge plume at Camas. The results of the CORMIX data provided in comment 15 are 2-3 orders of magnitude higher than those provided by either UM3 for Camas or any of the other facility dilution studies mentioned above.

The following comments are made specifically on the use of CORMIX2:

1. CORMIX2 uses a 2-D prediction model in the nearfield and assumes the discharge from 8 ports ensues from a 2-dimensional slot of equivalent port area. This attempts to approximate the details of the merging process of the individual jets from each port/nozzle. This approximation impairs the prediction of dilution factors within the nearfield zone where the acute zone boundary (32 feet) is located and the plumes from the individual ports are not merged, as assumed. The 3-dimensional UM3 (Visual Plumes) prediction shows that the acute zone is within the nearfield zone where the plumes have not merged. A CORMIX1 analysis using one of the 8 ports also suggests that the regulatory mixing zone (acute zone) is well within the nearfield region.

2. A 3-D analyses of plume(s) in the nearfield is most appropriate and can be done by using UM3 interface in Visual Plumes.

3. In module MOD238 of the output file for CORMIX2, the dilution factors are flux averaged. The dilution factors for freshwater in unidirectional flow should be based on centerline concentrations (the Department's Permit Writer's Manual). Thus, the dilution factors predicted by CORMIX2 (flux average) are not comparable to those of UM3 (centerline). In UM3 prediction file the centerline dilution is approximately 1/3 of the flux average dilution factors.

4. The ambient flow rate (3017.49 m3/s = 106561 cfs, see output "session report") used in CORMIX2 analyses (see Case NC9)was much lower compared to the flow rate (192,000 cfs) used in UM3 analyses. This would imply that the ambient river dimensions are wrong assuming that the ambient current used was correct. Other cases were not checked.

5. The plume is also characterized by passive diffusive mixing in the farfield region which in CORMIX2 is accomplished through a constant diffusion for bounded channels. UM3 interface in Visual Plumes also uses constant diffusivity (in Brooks farfield solution) to predict farfield dilution. However, the farfield dilution prediction depends upon the nearfield model output for initial conditions; therefore it is important that the nearfield dilution be as accurately predicted as possible.

6. In model run NC22B the discharge velocity at each port is 76 percent of the ambient velocity which is not a relatively small number as alluded to in the comments

7. There was also a comment suggesting the presence of local recirculation at the outfall and that this would lead to re-entrainment of already mixed water back into the buoyant jet region. First, there was no physical basis provided to indicate presence of local recirculation. Secondly, the re-entrainment of already mixed water would tend to reduce dilution factor compared to entrainment of ambient water that has not previously mixed with the effluent. Thirdly, the plume is not buoyant as eluded to (see Case NC9).

Due to the large difference in dilution prediction between UM3 (Visual Plumes) and CORMIX2 and the discussion provided above, the Department will only consider CORMIX2 if it is field verified, i.e. through a dye study. The Permittee may wish to conduct such a study over the life of the new permit. This is not required, but the Permittee may do so to satisfy and perfect the dilution factors used. The Department will not hold the permit up for these future studies.

Following these comments, the Department reexamined the dilution modeling conducted by Ecology for the permit and all details and parameters that went into them. As a result a couple of errors were found. These errors were limited to an incorrect port spacing and port depth used in the following runs: NC1, NC2, NC8, NC9, NC19, NC20, NC22B, NC24, NC25. These errors were not in the ambient or effluent conditions shown in table C6 but rather in not using these same conditions as we said we did through out the model runs. These model runs were rerun and resulted in one or two points in each dilution factor. In a couple of cases the dilution went down when the port depth should have been in shallower water, e.g., the dry season chronic dilution went from 48 to 45. The winter acute dilution went from 5 to 6.5, therefore the number was rounded to 7 and all the reasonable potential evaluations were recalculated. The previous low acute dilution occurred during medium river discharge, however, after recalculating this dilution was no longer the lowest. The new lowest acute dilution occurred during the high flows and average yearly temperatures (See table C6 in Appendix C of this fact sheet).

The resultant changes did not make a large difference in the reasonable potential evaluation and resulted in only minor changes to limits already proposed.

It should be noted that the Permittee is required to provide the Department all pertinent information which they wish considered in development of their permit with the permit application. From this information and the best information available to the Department we develop a permit. In the future, the Permittee is encouraged to provide all information it wishes to be considered with its application for permit renewal.